شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائق الاصلية تالفة

بالرسالة صفحات لم ترد بالاصل

ZAGAZIG UNIVERSITY (BENHA)
FACULTY OF SCIENCE
CHEMISTRY DEPARTMENT

SYNTHESIS AND EVALUATION OF SOME STYRENE ALKYL METHACRYLATE COPOLYMERS

THESIS

Submitted to the Faculty of Science

Zagazig University - Benha
In Partial Fulfillment of the Requirements for the Degree of Master of Science (Organic Chemistry)

By

AHMED MUSTAFA EL-NAHAS
(B.Sc. Chemistry 1999)
Chemistry Department - Faculty of Science
Ain Shams University

Supervised by

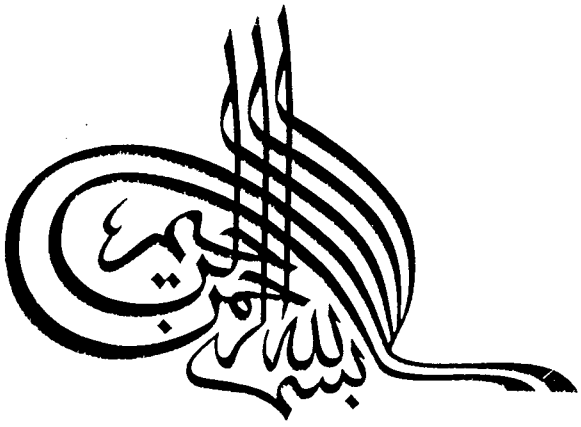
PROF. DR. A.F. SHAABAN
Prof. of Organic Chemistry
Faculty of Science
Zagazig University (Benha)

PROF. DR. H.H. ABOU EL NAGA
Consultant of Petroleum and Petrochemical Industry

PROF. DR. M.M. AZAB
Prof. of Organic Chemistry
Faculty of Science
Zagazig University (Benha)

Dr. M.A. EL-KASABE
General Manager of Research and Development Department
Alexandria Company for Petroleum Additives (ACPA)

2005



رب أوزعني أن أشكر نعمتك التي أنعمت علي وعلى

والدي وأن أعمل صالحا ترضاه وأدخلني برحمتك

في عبادك الصالحين

صدق الله العظيم

ZAGAZIG UNIVERSITY (BENHA)
FACULTY OF SCIENCE
CHEMISTRY DEPARTMENT

SYNTHESIS AND EVALUATION OF SOME STYRENE - ALKYLMETHACRYLATE COPOLYMERS

By

Ahmed Mustafa El-Nahas

Advisors

- **Prof. Dr. A. F. Shaaban** A.F. Shaaban
- **Prof. Dr. H. H. Abou El Naga** Abou El Naga
- **Prof. Dr. M. M. Azab** M.M. Azab
- **Dr. M. A. El Kasaby** Masaad

Note

Beside the wok carried out in this thesis, the candidate has attended post-graduate courses in Organic Chemistry, covering the following topics:

1- physical organic chemistry.

2- Heterocyclic chemistry.

3- Organic microanalysis.

4- Organic spectroscopy (U.V., I.R., N.M.R., M.s.)

5- Selected course.

6- Applied organic chemistry (petroleum chemistry and petrochemicals).

7- English language.

Prof. Dr. Hassan A. Dessouki

H A. Dessouki

Head of Chemistry Department

Acknowledgement

*First of all, thanks to **GOD**, for helping me to accomplish this work properly. I'm greeting and give all my thanks and express my deep appreciation to:*

*I would like to thanks and express my deep love and sincerest appreciation to **Prof. Dr. Abdel Fattah Fadel Shaaban**, Professor of Organic Chemistry, Faculty of Science, Zagazig University, Benha Branch and **Prof. Dr. Hamdi H. Abou El Naga**, Consultant of Petroleum and Petrochemical Industries, whom suggested and supervised the work, for their support and guidance throughout my whole work.*

*Also, I would like to thanks and express my deep love and sincerest appreciation to **Prof. Dr. Mohamed Morsy Mohamed Azab**, Professor of Organic Chemistry, Faculty of Science, Zagazig University,Benha Branch. for his valuable advises, great help, continuous encouragement and support with valuable discussion and kind supervision during the preparation of this work.*

*Thanks are due to **Dr. Mossad Attia El Kasabe**, General Manager of research and development department, Alexandria Company for Petroleum Additives (ACPA), for support, encouragement and kind supervision.*

Many thanks and appreciation to the staff of research center, Misr Petroleum Company. Special thanks are due to:

- *Prof. Dr. Wedad M. Abdel Azim, Manger of Analytical research department.*
- *Chemist. Mohamed Fakhre,*
- *Chemist. Sahar A. Mazen,*
- *Chemist. Ahmed Abdel Rahman*

For their constant support and encouragement.

I am most grateful to all these people and those, with whom I have made acquaintance in order to retrieve information, who shared with me a lot of valuable and indispensable data.

Finally, I would like to thank my family for their encouragement and great patience.

CONTENTS

AIM OF THE WORK

This study aimed at establishing an effective methods to prepare styrene alkyl methacrylate copolymers, which can be used as viscosity index improvers and/or pour point depressants for lubricating oils.
Different alkyl methacrylate monomers have been used through this work.

PLAN OF WORK

I) Carrying out copolymerization reactions between two or more than one type of monomers with styrene to produce some copolymers, these reactions include:

1- Binary copolymerization of alkylmethacrylates with styrene.

2- Quaternary copolymerization of alkylmethacrylates with styrene.

II) Characterization of prepared copolymers via:

1- IR spectroscopy.

2- ^{1}H NMR spectroscopy.

3- Molecular weight.

III) Evaluation of prepared copolymers as:

1- Viscosity index improver (V.I.I.).

2- Pour point depressants (P.P.D.).

IV) Comparative evaluation with imported commercial additives

Introduction